

AMENDMENTS TO THE CLAIMS

No changes to the claims have been made.

Claim 1 (original): A liquid crystal display, comprising:

a sapphire substrate having a first crystal lattice structure;

a single crystal silicon structure having a thickness no greater than about 100 nanometers affixed to said sapphire substrate to create a silicon-on-sapphire structure, and a second crystal lattice structure oriented by said first crystal lattice structure;

an array of liquid crystal capacitors formed on said silicon-on-sapphire structure; and

integrated self-aligned circuitry formed from said silicon layer which is operably coupled to modulate said liquid crystal capacitors.

Claim 2 (original): The liquid crystal display of claim 1 wherein said sapphire substrate has an r-plane orientation and said single crystal silicon structure has a (100)-orientation.

Claim 3 (original): The liquid crystal display of claim 1 wherein each of said liquid crystal capacitors is coupled to a transistor formed on said silicon-on-sapphire substrate.

Claim 4 (original): The liquid crystal display of claim 3 wherein each of said liquid crystal capacitors is a nematic liquid crystal capacitor.

Claim 5 (original): The liquid crystal display of claim 4 wherein said liquid crystal capacitor provides a reflective pixel element.

Claim 6 (original): The liquid crystal display of claim 4 wherein said liquid crystal capacitor provides a pixel element that is transmissible to light.

Claim 7 (original): The liquid crystal display of claim 1 wherein each of said liquid crystal capacitors is a ferroelectric liquid crystal capacitor.

Claim 8 (original): The liquid crystal display of claim 7 wherein said liquid crystal capacitor provides a reflective pixel element.

Claim 9 (original): The liquid crystal display of claim 7 wherein said liquid crystal capacitor provides a pixel element that is transmissible to light.

Claim 10 (original): A method for fabricating a monolithically integrated liquid crystal array display and control circuitry on a silicon-on-sapphire structure, comprising the steps of:

- a) affixing a sapphire substrate having a first crystal lattice structure to a single crystal silicon structure having a thickness no greater than about 100 nanometers and a second crystal lattice structure oriented by said first crystal lattice structure to create a silicon-on-sapphire structure;
- b) ion implanting said single crystal silicon structure with a species selected from the group consisting of silicon ions, tin ions, germanium ions, and carbon ions to create an ion implanted silicon layer;
- c) annealing said silicon-on sapphire structure;
- d) oxidizing said ion implanted silicon layer to form a silicon

dioxide layer from a portion of said silicon layer so that a thinned, ion implanted silicon layer remains;

e) removing said silicon dioxide layer to expose said thinned ion implanted silicon layer;

f) fabricating transistors wherein each of said transistors is formed by patterning said thinned ion implanted silicon layer to create a patterned silicon layer, growing a gate oxide on said patterned silicon layer; forming a polysilicon layer over said silicon-on sapphire structure; doping said polysilicon layer; patterning said polysilicon layer and said gate oxide to form a gate region and to expose selected regions of said thinned, ion-implanted silicon layer; ion implanting said selected

regions of said epitaxial silicon layer to create source and drain regions in said thinned, ion-implanted silicon layer that are self-aligned with said gate region;

g) fabricating electrical contacts that are electrically connected to said transistors; and

h) fabricating liquid crystal capacitors on said silicon-on sapphire structure that are electrically connected to said transistors by said electrical contacts.

Claim 11 (original): The method of claim 10 wherein said sapphire substrate has an r-plane orientation and said single crystal silicon structure has a (100)-orientation.

Claim 12 (original): The method of claim 10 wherein said transistors include nonlinear circuit elements.

Claim 13 (original): The method of claim 10 wherein said liquid crystal capacitors include nematic liquid crystal capacitors.

Claim 14 (original): The method of claim 10 wherein said liquid crystal capacitors include ferroelectric liquid crystal capacitors.

Claim 15 (original): The method of claim 10 further includes fabricating polarizers on said silicon-on-sapphire structure.

Claim 16 (original): The method of claim 10 further includes forming a layer of optical filters on said silicon-on sapphire structure.

Claim 17 (original): The method of claim 10 includes the steps of:

implanting said silicon ions at a dosage of about 10^{14} cm⁻², at an energy level of about 185 keV and, at a temperature of about -20/C;

immersing said silicon-on-sapphire structure in a nitrogen atmosphere having a temperature of about 550/C for approximately 30 minutes;

increasing the temperature of said nitrogen atmosphere in which said silicon-on-sapphire structure is immersed from about 550/C to about 900/C in about one hour;

annealing said silicon-on sapphire structure in said nitrogen atmosphere for about one hour at 900/C; and

oxidizing said silicon layer in an oxygen atmosphere having a temperature of about 1000/C.